

WHAT IS CLAIMED IS:

1. A stop and start control apparatus of an internal combustion engine, comprising:

5 a stop control unit for performing a stop control by supplying fuel into a combustion chamber of cylinder which is in a compression stroke and/or in an expansion stroke at a time of stopping the engine;

10 an unburned fuel discharge preventing unit for preventing discharge of the fuel when it is estimated that the fuel in the combustion chamber of the cylinder is discharged in an unburned state, at a time of the stop control of the engine;

15 a combusting unit for combusting, at a time of starting the engine, the fuel supplied to the combustion chamber of the cylinder; and

a starting unit for starting the engine by utilizing combustion pressure obtained from the combusting unit and/or a motor.

20 2. The stop and start control apparatus of the internal combustion engine according to claim 1, wherein it is estimated that the fuel is discharged in the unburned state when an ignition switch is turned off during the stop control of the engine.

25 3. The stop and start control apparatus of an internal combustion engine according to claim 1, wherein the stop control unit further comprises:

30 a unit for supplying fuel, during operation of the engine, into the combustion chamber of the cylinder which is in the compression stroke and/or the expansion stoke; and

a unit for adjusting a crank angle position so that the engine stops at the cylinder which is in the compression stroke and/or the expansion stroke, at the time of stopping the engine.

4. The stop and start control apparatus of the internal combustion engine according to claim 1, wherein the unburned fuel discharge preventing unit prevents the fuel supplied to the combustion chamber of the cylinder which is in the compression stroke or the expansion stroke, when it is estimated that the cylinder which is in the compression stroke or the expansion stroke at the time of stopping the engine passes an exhaust stroke.

10 5. The stop and start control apparatus of the internal combustion engine according to claim 1, wherein the engine further comprises an opening and closing unit for opening and closing an exhaust valve, and when it is estimated that the cylinder, which is in the compression stroke or the expansion stroke at the time of stopping the engine, passes the exhaust stroke, the opening and closing unit prevents the fuel supplied to the combustion chamber of the cylinder, which is in the compression stroke or the expansion stroke, from being discharged.

20 6. The stop and start control apparatus of the internal combustion engine according to claim 1, wherein the unburned fuel discharge preventing unit prevents discharge of the fuel by combusting the fuel by the combusting unit before the fuel supplied to the combustion chamber of the cylinder which is in the compression stroke or the expansion stroke is discharged, when it is estimated that the cylinder which is in the compression stroke or the expansion stroke at the time of stopping the engine passes the exhaust stroke.

30 7. The stop and start control apparatus of the internal combustion engine according to claim 1,

wherein the starting unit starts the engine by utilizing combustion pressure obtained from the combusting unit when a first starting condition is established; and

5 wherein the unburned fuel discharge preventing unit prevents discharge of the fuel by combusting the fuel by the combusting unit before the fuel inside the combustion chamber of the cylinder is discharged in the unburned state.

8. The stop and start control apparatus of the internal  
10 combustion engine according to claim 1,

wherein the starting unit starts the engine by utilizing combustion pressure obtained from the combusting unit and the motor, and starting supply of the fuel to the engine in a predetermined period, when a second starting condition is  
15 established; and

wherein the unburned fuel discharge preventing unit prevents discharge of the fuel by combusting the fuel by the combusting unit, before the fuel in the combustion chamber of the cylinder is discharged in an unburned state.

20 9. The stop and start control apparatus of the internal combustion engine according to claim 7, further comprising:

a torque absorbing unit for absorbing an engine torque generated when the fuel in the combustion chamber of the cylinder  
25 is combusted by the combusting unit.

10. The stop and start control apparatus of the internal combustion engine according to claim 9, wherein the torque absorbing unit applies torque by the motor in a counter rotation  
30 direction to a rotation direction of the engine rotated by receiving the torque generated by combustion of the fuel.

11. The stop and start control apparatus of the internal combustion engine according to claim 1, wherein the engine further comprises a unit for displaying an alarm at a time of execution of an operation by the unburned fuel discharge preventing unit.

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12. The stop and start control apparatus of the internal combustion engine according to claim 11, wherein the engine comprises a unit for stopping the engine after the unburned fuel discharge preventing unit finishes the operation.